

01/03

**BALLARAT
AMATEUR
RADIO
GROUP INC.**

NEWSLETTER

P.O. BOX 1261
Mail Centre
Ballarat

**MARCH 2001
VOLUME 24 No. 2**

Official Newsletter of the Ballarat Amateur Radio Group Inc. No. 6953T



VK3BMIL



BALLARAT AMATEUR RADIO GROUP INC.

Inc. No: 6953T

OF

OFFICE BEARERS - 2000 / 2001



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VK3CFB	JIM WRIGHT
VK3AXH	IAN MC.DONALD
VK3WN	KEVIN HUGHES
exVK3AQM	PHIL SNEDDON

REPEATERS

VK3RBA (Voice)	146.750 MHz. - Mt. Buninyong.
VK 3RPC (Packet)	144.750 MHz. - Mt. Warrenheip.
VK3RBU (Voice)	438.475 MHz. - Mt. Hollowback.
VK3RMB (Beacon)	432.535 MHz. - Mt. Buninyong.
VK3RBV (ATV)	426.250 MHz. - Ballarat

ACTIVITIES CLUB NET: Thursday nights at 8 pm. (8.30 pm during Daylight Saving). Freq: 3.610 MHz +/- QRM.

2 METRE SCRAMBLE: Sunday Nights at 7.50 pm. Freq: 146.425 to 146.600 MHz. Inc,
Call back held on VK3RBA 146.750 MHz.

MEETINGS: General Meeting : Last Friday of each month (except December) at 8.00 pm.

Venue: Club Rooms - Ballarat Airport - Unit 31 - Off Learmonth Road - Ballarat.

CONSTRUCTION NIGHTS: Saturday Afternoons at clubrooms.- 1 pm.,

HAMVENTION : 27th & 28th. October 2001.

INTERNET ADDRESS: <http://www.qsl.net/vk3bml/index.htm>

PLEASE ADDRESS ALL CORRESPONDENCE to: The Secretary - BARG Inc. Box 1261 Mail Centre Ballarat 3354

NEWSLETTER ARTICLES to Marion Diprose (VK3FJW) 7 Winifred Street Mitchell Park 3355 - email to :- diprose@giant.net.au



The Minutes



MINUTES OF B.A.R.G GENERAL MEETING

Meeting held on, February 23RD 2001

The meeting was opened at 8:04PM by the President Geoff VK3ADB, welcoming all in attendance.

Apologies: VK3's AAI, JEM, NIZ, HWK, and XDQ

Minutes: The minutes of the previous meeting as presented in the newsletter were confirmed.

Moved VK3HEG, Sec. VK3FGC

Correspondence:

In: Various club newsletters, Junk mail, WF Coltman (re-issue), Membership from G Lance, Letter from the city Re: The airport land area. Letter from the city Re: Promote your business, Feb 2001 AR, Feb 2001 QST, Letter from Mary Re: Keys, Receipt from the city for rent

Out: Letter to the Vic WIA, requesting info on the 2001 call books.

Treasurer's Report: As read by Geoff on behalf of Murray. Moved: VK3FGC, sec. VK3CAZ

Membership: We need your support to keep the club running. How about joining in on some of the activities that we do throughout the year. Do you know anyone that would like to join the club? Then how about getting them involved and showing them the things we do.

Reports:

Facilities: The power board problem is now in hand. This was our monthly eat out evening.

Education: No classes as of yet.

Hamvention: Still needs someone to take over from Tom. This position needs to be filled, as it would be a shame for this years Hamvention to fail.

Scramble: The scramble could do with a few more, we seem to have the same few each week.

Net: Going along nicely, with a good turn up each week. Clem is enjoying the net, but would like to see some more action from our club members.

Tech.: A big thanks must go to both Bob and Ian for doing a great job on fixing the problems with VK3RBA and also in getting a great new repeater in VK3RWA on Mt Ben Nevis. A number of the clubs HF antenna's are in need of repair, as they are rather bad performers, and they could do with a spruce up.

Wicen: Sunday the 11th of March was the Begonia rally, and a few of the wicen guys provided the Communications for the event.

Publicity: By the time this is printed, our trip to the EMDRC hamvention would have been and gone. It should be a very eventful day and well worth the early morning start.

How do members feel about a teeshirt with the clubs logo, and or your call sign on it or a cap with the same?

General: A membership drive is being thought of and initial idea's have been put forward. One being that we offer a discount to non licensed persons. What are the club member's feelings on this idea and do you have any other's for raising the number of members.

Meeting closed at 8:40pm

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Coming Events



Friday 30th March	General Meeting
Saturday Afternoons	Construction Days—Clubrooms at 1pm
Sunday Nights	2M Scramble—7.50pm 146.425 to 146.600 MHz
Thursday Nights	Club Net 3.610 MHz—8.00pm
4th Wednesday	WICEN Training Nights
Friday 20th April	Dinner Outing at Atlantic Hotel
Friday 27th April	General Meeting

I don't know where the time goes but we are around to newsletter time again. Last month I was reporting on VK3RBA and also on the fact that VK3RWA would soon be back on the air. Indeed they are both up and running and I think that reports that have come in suggest that they are both performing well. Personally I have found RBA to be performing better in areas that were a bit dodgy before so lets hope that we get continuing good performance from them.

Well another job that is near completion is the operations room. The clubs transmitters have been mounted in the console and it looks great. Thanks go to Jeff VK3PAP for the fitting work; Geoff VK3ADB for supplying the panels and that left yours truly to do the electrical stuff. I'd like to thank Les, V3JEM who had completed earlier work on the console so it has been quite a team effort.

More work has been done on the wire antennas so it is all come together to make a good station for our members to drop in, operate and enjoy. Thursday night coffee and the net would go well!

Unfortunately the weather wasn't very good for portable operations on the John Moyle weekend but a last minute decision to activate VK3BML was taken by Ian VK3AXH and myself. Although only a couple of hours it was enjoyable.

Hopefully during the next few weeks the 2m antenna and a new UHF antenna will be mounted on a more suitable tower with short coax runs to the transmitters.

Unfortunately BARG's FT101 transceiver has a burnt out power transformer so if anyone knows where we can pick up a wrecked 101 then please let's know.

Ok that's about it till next time.

Bob. V3BNC.

Next Dinner Outing

Our next outing will be at the Atlantic Hotel, 628 Skipton Street at 6.30pm on the 20th April. Please contact Betty (5339 5317) to book your place for this evenings fine company over a great meal..

LAWN MOWING ROSTER

April Reg VK3 CAZ and John VK3 CJB

If you unable mow this month,
please arrange a swap with someone else.
Thanks for your help guys.

Wanted

1. UHF 40ch CB, must be in good condition, and come with car mounting bracket/power cable. (willing to pay to \$100)
2. Small rotator, that will take a small 4ele 2m quad and 9ele 2m beam antenna. Must have manual, and a good remote display module/box.

JUST A THOUGHT

Rules of the air

You start with a bag full of luck and a bag full of experience.
The trick is to fill the bag of experience before you empty the bag of luck.

For Your Enjoyment



To all Members of AMSAT-NA

The following statement is addressed to those members of AMSAT-NA who have requested an explanation of the December 2000 incident that took place on P3D. This statement has been prepared and developed by Robin Haighton, VE3FRH, President of AMSAT-NA, with input and review from other AMSAT-NA members. As you are aware, Phase 3D was launched on November 16, 2001 into an almost perfect geosynchronous transfer orbit (GTO) by an Arianespace launch vehicle (AR-507) from Kourou, French Guiana. Within a few hours of launch excellent telemetry was being received from the 2-meter beacon, and Amateur Radio stations worldwide started downloading data with great accuracy, due in-part to the strong signal strength. The original plan was to use the 70-cm beacon, however, for reasons not yet known, the 70-cm transmitter signal was not heard. Before the satellite could be regularly used for general Amateur Radio communications, it was necessary to carry out orbital changes, stabilise the satellite, open the solar panels, etc. The first changes to the orientation of the satellite were carried out using the onboard magnetorquing system - this worked well and after relatively few orbits the attitude of (now) AO-40 was 270/0, and ready for operation of the 400 Newton motor. Among the many components which comprise this motor system, there are several valves which control pressurising helium and fuel. During construction of the satellite it was noted that one of the helium valves had a tendency to "stick" when operated. Both of these valves were sent back to the manufacturer for inspection and repair. Both valves were inspected and one valve was repaired, followed by return and re-installation into the system. On the first attempt to fire the 400-N propulsion system, it failed to operate, possibly due to a sticking helium valve. Before the second attempt, it was determined that the fuel tanks could be pressurised (by helium) to their correct pressure over a five minute period, and although this was about one-tenth of the normal helium flow rate, it was still adequate for the planned three minute motor burn. On the second attempt to fire the 400-N motor, all systems appeared to respond correctly at first. At the three minute mark the internal timer transmitted a signal for the main solenoid valve to close, which should have shut off the fuel to the motor. Telemetry shows that the signal was sent and received, but the motor did not shut off for two or three more minutes, placing AO-40 into a higher apogee orbit than was planned at that time. To understand how this may have happened, it is necessary to be aware that the fuel for the 400-N motor is made up of two components, hydrazine (MMH) and nitrogen tetroxide (N₂O₄), with each component contained in two separate tanks, both of which could be pressurized by helium. Helium could also be applied to the solenoid motor valve, the output of which operates the two fuel valves which start (and stop) the fuel flow. These valves are actually part of the 400-N motor and are located inside the motor itself. On the solenoid motor valve there is an evacuation port that allows excess helium at the output port of the valve to escape when closing the valve. It is believed that this evacuation port was blocked and that the output port remained pressurized beyond the three minute mark of the motor operation - thus the motor continued to burn for an extended period of time. Between the fuel tanks and the 400 Newton motor there are fuel isolation valves which are pressure operated by the helium system. When the pressure in the helium manifold had been reduced to approximately 6-Bar (100 PSI) the fuel isolation valves closed and prevented any additional fuel from entering the motor, stopping the burn. At this time it is possible that the main motor valves were still open, due to the trapped pressurized helium that had not vented at the solenoid motor valve. Approximately twelve minutes after the motor shut down, a second anomaly occurred. This was detected when the motor solenoid valve changed from closed to open, possibly caused by fuel migrating in the lines between the isolation valve and the 400-N motor. The motor could have also "burped" or "popped" as the fuel mixed and then ignited. High pressure helium (180 Bar) is fed to the motor system via a high pressure on/off valve and a regulator valve - reducing the pressure to a nominal 15 Bar level. It is then fed to the low pressure helium manifold. Because of the longer 400-N burn, a program for testing the high pressure helium valve was written to "cycle" the valve (to insure proper functioning) and uploaded to AO-40. On December 11, 2000, while cycling the helium valve, a sudden loss of signal from AO-40 occurred. It is believed that during this exercise the system became pressurized and that a leakage of fuel was the end result. Initial thoughts were that the spacecraft was completely dead and that chances of recovery were remote, with the possibility that AO-40 was in multiple pieces. However, with help from NORAD, it was determined that the satellite was in one piece and still in its known orbit, with a possibility of some recovery. At least two automatic resets passed without hearing from the spacecraft. It was decided to try and hear the general beacon on the S-band (2.4 GHz) transmitter. On Christmas Day 2000 the second attempt to activate the S-band transmitter was successful, and since that day downlink telemetry has been recovered on a regular basis. The following items have been found to be working; the 2-meter, 70-cm and 1.2 GHz receivers, the S-2 (2.4 GHz) transmitter, the magnetorquing system, the YACE camera, IHU-2 and the high-gain antennas. The following items are believed not to be working; the 2-meter and 70-cm transmitters and the omni-directional antennas. At the time of this bulletin (March 16, 2001) we still do not know the status of the Arc-jet motor - which is an important item, needed to position the satellite for future use. We do know that the satellite has lost mass, and we attribute this to the loss of bi-propellant fuel from the 400-N motor. The satellite spin rate had increased as the overall weight decreased, but by using the magnetorquing system the spin rate is now nearly down to a usable 5 RPM. In addition, the heat pipe system (which became unusable at the higher spin rates) has now become effective again. Soon AO-40 will be able to be re-orientated so that the high-gain antennas will face the Earth, and the Arc-jet motor will be tested. Following the re-orientation it will be possible to test the remaining systems on board the spacecraft and to determine which systems and bands will be available for future operations and under what conditions. As we all learn more about the status of the satellite, additional bulletins will be posted on AMSAT-BB, and placed on the AMSAT-NA, AMSAT-DL and AMSAT-UK web sites. Meanwhile, all those involved in the recovery of AO-40 are to be congratulated for their skills and perseverance, and may their hard work continue to bring us an operational satellite.

73, Robin Haighton VE3FRH
resident AMSAT-NA

TECH TALK



EVERYTHING COMES TO THOSE WHO WAIT (EVENTUALLY).

Back around 1946/7 I saw a piece of 'doggerel poetry' about radar in one of the amateur radio magazines, which at the time, I thought was "QST" but might have been the British "ShortWave Magazine".

As a young lad avidly studying the subject at RAF Cranwell I was amused by it and the first few lines stuck in my mind. Probably they occupied memory that should have been devoted to the main subject but nevertheless it went into partial storage.

Twenty-five years later I mentioned it to someone I was working with and he was similarly amused and set out to find it without a great deal of success.

Imagine my surprise when on November 21 2000 I got a phone call to say he had tracked down a version which was not exactly the same as the one I remembered but which he sent to me. With that as a trigger to my ailing memory the missing pieces fell into place and I was able to 'reconstruct' it and here is the version I knew, hopefully for your amusement, but about 45 years late !!.

THE RADAR MAN

If you should see upon the street,
a man equipped with dipole feet,
with a family of curves trailing behind,
he's a radar man with a micromind.

With micro-secs and microwaves,
the radar man fills in his days,
until at last with the passage of time,
he finally develops a micromind.

His eyes take on a neon gleam,
his ears extend to a yagi beam,
his mouth becomes another pulse-gate,
and his heart pumps blood at a video rate.

The Doc' laid down his stethoscope,
turned to his colleagues and softly spoke,
"No trace of a brain that I can find,
He's a radar man with a micromind".

Originally from "The Beacon" published 15/6/44, author unknown. The "Beacon" was, I believe, an 'in-house' newsletter/magazine of one of the TRE groups which developed British Radar in the war years.

Reg VK3CAZ

TECH TALK



IS THAT POWER SUPPLY OVERHEATING ?

The time honoured method of judging whether the power supply is able to manage with the load you have applied is to feel the core or, in extreme cases, sniff for the "strong brown smell" from an overheating transformer, neither of which is particularly useful or even accurate.

However now that digital meters appear to have swept the analogue meter out of favour, their easily read and pretty accurate resistance measuring mode can be used to determine the rise in temperature of the transformer winding when under load which is a much more meaningful measurement.

The method is based on the fact that the temperature co-efficient of copper is known and can be related to the temperature of the winding by means of just two resistance measurements.

Knowing that the temperature co-efficient of copper is 0.0039 what we do is measure the resistance of one of the windings (preferably a winding of fairly high resistance and also one which is buried in the transformer rather than one wound on the outside of the transformer). We measure it when the unit is cold and again after a period under maximum load conditions, when the device has had long enough to get up to maximum operating temperature (which may be several hours in the case of a large transformer/power supply).

SWITCH IT OFF AND DISCONNECT IT BEFORE TRYING TO MAKE THE MEASUREMENTS OR YOU MAY FRY !!!!

The temperature rise is given by the expression below

$$\text{Temperature rise in degrees C} = \frac{R(\text{hot}) - R(\text{cold})}{R(\text{cold} \times 0.0039)}$$

Bear in mind that this is the increase over AMBIENT temperature which should be measured or known with a fair degree of accuracy when starting the test and any changes during the test period allowed for. Most transformer insulating materials have a limit of maximum temperature around 105 C and at that level it is beginning to push the reliability a little. Allowing for various factors then for safety the rise in temperature over ambient should not be more than 40-45 degrees C.

As an example: consider a transformer which under full load has a resistance increase from 10.1 ohms to 11.3 ohms over the period of the test.

$$\text{Temp rise} = \frac{11.3 - 10.1}{10.1 \times 0.0039} = \frac{1.2}{0.03939} = 30.46 \text{ Degrees C}$$

This has to be ADDED to the Ambient Temperature for a final result

73 Reg VK3CAZ

TECH TALK



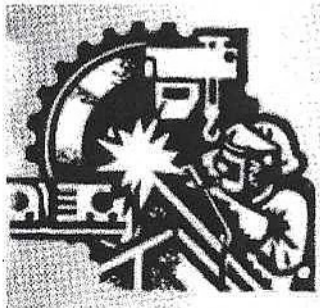
CUTTING A PIE INTO 51.5 BILLION PIECES. (Reg VK3CAZ)

This halfwitted computer being unable to supply the symbol for the relationship between the area of a circle and its circumference you will have excuse the use of the 'simile'?? for the relationship. The symbol we use today first appears in a work on Mathematics by William Outred in 1652 and its widespread use as a symbol was established by another famous mathematician Leonhard Euler from 1736 onwards. The value can now be calculated to over 50 billion places although it is difficult to see a reason for such accuracy since using the old schoolboy approximation of $22/7$ gives a value to better than 0.05 %. With six places of decimal the circumference of a circle 100 metres in diameter can be calculated with an error less than the thickness of a human hair. The apparent never-ending stream of digits after the decimal point (3.1415926536979.....) provides a real mystery. In 1996 two gentlemen named Kanada and Takahashi managed to calculate it to 51.5 Billion places (of course those are American billions not real ones but it is still a mighty big number or should it be small ??)

The first recorded calculation based on 'squaring the circle' is in the Rhind Papyrus from Egypt at around 1650 BC. That result was "the area of a circle equals the area of a square of sides $8/9$ of its diameter". This provides a value of $256/81$ (about 3.1605) which is accurate to about 1% and this accuracy was not much improved over the next 1000 years.

Calculations by the ancient Greeks were based on approximating the area of a circle to an inscribed polygon and, even better, to the average between inscribed and escribed polygons. The areas of the polygons were determined by splitting into their constituent triangles and summing the individual areas. Clearly as the number of sides increased so did the accuracy of the calculation.

Archimedes used a 96 sided polygon and decided the value was such that $3.141 (223/71) < \pi < 3.143 (22/7)$ and that is accurate to better than 0.009% and that was around 220 BC. Around 263 AD the Chinese mathematician Liu Hue used polygons of 192 and later of 3072 sides and got a value to better than 0.0003 %. Later in the fifth Century a polygon of 24,776 sides was used by two other Chinese Tsu Ch'ungchih and his son. They achieved an accuracy to better than nine millionths of 1 %. In 1579 Francois Viète, a French lawyer, used a polygon of 393,216 sides and provided a value accurate to ten decimal places, sufficient to calculate the circumference of the Earth, assuming this to be a true sphere, to within a few millimetres. Viète was also one of the first to derive a series formula from which the value could be calculated. His method was somewhat complex and required complex square root calculations. But this was a radical change in attack and led to new ways of looking at the problem which was then handed over to the present days computers.



PRACTICAL ENGINEERING

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THANK YOU

We acknowledge the assistance of
The Hon. Michael Ronaldson MP
Federal Member for Ballarat
in the
Printing of this Newsletter.

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PLEASE NOTE

CUT OFF DATE FOR ARTICLES FOR PUBLICATION IS NOW THE SECOND MONDAY OF EACH MONTH.

B.A.R.G.

The Ballarat Amateur Radio Group Inc.

A group of radio enthusiasts licensed to experiment with local and international radio communications on an amateur basis.

NEW MEMBERS ALWAYS WELCOME.

OFFICIAL NEWSLETTER OF THE BALLARAT AMATEUR RADIO GROUP INC.
Inc.No: 6953T

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NEWS

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